# I Introduction

Seattle is uniquely situated among the ridges and valleys of the Puget Sound lowlands allowing for spectacular views from the natural geographic features of the Olympic and Cascade Mountain ranges, and the waterways of Puget Sound, Lake Washington and Lake Union. In addition to its natural features, Seattle's urban setting provides spectacular viewsheds of the downtown skyline, historic landmarks, neighborhood architecture and built structures such as the Space Needle and the Lake Washington Ship Canal.

The Seattle Department of Parks and Recreation (SPR) has acquired a wide range of parkland offering public view. The view from these sites is protected under the Master Use permit and the State Environmental Protection Act (SEPA). Some of these public viewpoints are have been threatened by development activity. Recent studies have been conducted to inventory park sites, document SEPA designated views, and determine the impacts of development on viewpoints. In addition to the threat of development, there is also a threat of view obstruction by vegetation. Reductions in maintenance funds allowed trees and vegetation to block many of the designated public viewpoints. SPR has begun the process of evaluating landscape maintenance and management issues to optimize designated views. The intent is to develop a Vegetation Management Plan that provides public view access to the region's natural and built features through the creation of sustainable vegetative communities. The City of Seattle is committed to conservation, and is dedicated to providing a legacy for future generations of residents and visitors by preserving the views and vistas that naturally highlight the unique topography of Seattle.

The intent of this document is to provide a set of guidelines that will integrate current practices, future vegetative needs and the management objectives of the site. All site specific work will be done in accordance with current SPR practices and procedures, and with the involvement of the surrounding community.

## Goals and Objectives

In finding a balance between natural resource conservation and view preservation, the SPR's primary goals for developing a Vegetation Management Plan for viewpoints are:

- to protect designated public views
- to protect steep slopes from erosion and surface water run-off
- to provide maximum native habitat value for wildlife
- to minimize hazard potential and optimize public safety

- to provide consistent, pragmatic management direction to establish and maintain sustainable vegetation for all viewpoints
- to derive the initial project needs for each viewpoint
- to provide a baseline for the development of specific plans that address both neighborhood and citywide needs and concerns.

As part of the development of the Viewpoints Vegetation Management Plan an extensive review was completed of previous studies and documents. Consistent with preceding and on-going work by the SPR, this plan incorporates practices set forth by Seattle Parks Best Management Practices, adopted Vegetation Management Plans for specific parks with viewpoints, polices and procedures related to SPR Public Involvement Process (PIP) and recommendations from maintenance and professional staff.

The Vegetation Management Plan for Viewpoints addresses the following objectives:
1) evaluates pre-determined viewpoints to assess current maintenance and management needs;
2) categorizes viewpoints based on shared site conditions and maintenance requirements to optimize intended viewsheds;
3) develops maintenance prescriptions that can be applied to all sites having similar conditions with consideration given to sustainable management practices;
4) defines maintenance practices and the appropriate labor force for each viewpoint.

## Viewpoint Site Selection Criteria

Park sites included in this study provide the basis for developing viewpoint maintenance criteria. Site conditions range from steep hillsides, to shoreline habitats, and to 'pocket' parks adjacent right-of-ways. View-types also vary from panoramic vistas to framed and secondary views.

A landscape management framework has been established from the evaluation of these diverse sites and conditions. The Vegetation Management Plan will provide the maintenance templates needed to continue viewpoint management over time for all existing viewpoint parks as well as new sites as they are acquired. The 24 parks addressed in this report meet one or more of the following criteria as determined by the Urban Forestry Division:

- SEPA view designation with a significant vegetation component affecting current views

- No current landscape maintenance or management plan

- Highly valued property proposed for viewpoint status but not currently designated

## II View Management Landscape Zones

The management of each viewpoint is subdivided into three management zones. Management zones are primarily defined by the location along the slope of the site and the potential impact of vegetation within the zone on the view. Work prescriptions are designed to address maintenance issues within each zone based upon the needs of the site. The three zones are described as follows:

**Zone 1 – Developed park landscape**
This area has the most level grades and is located at the top of a slope. Zone 1 is usually the most accessible portion of the site and the most actively used for park functions. Zone 1 is generally the viewing area of the viewpoint. Maintenance demands are often the greatest in this developed portion of the park. The vegetation in Zone 1 often includes turf and ornamental plants requiring regular pruning and more attention than the naturalized areas.

For most viewpoint parks, the SPR provides site furnishings in Zone 1 to support and encourage the use of the park. Benches, trash receptacles and often defined viewing locations have been marked to enhance and enrich the viewing experience.

Currently, the maintenance in Zone 1 for most viewpoint sites is managed by the local Park District maintenance staff.

**Zone 2 – Transition area at crest of slope**
This zone is located at and immediately below the slope. Depending upon the site, grades in the transition zone can range from a ridge to a gentle slope, or a bluff condition where erosion issues are of paramount concern. Since erosion potential is highest at the crest of all slopes, vegetative cover is critical in minimizing surface soil attrition and preventing the loss of land from surface erosion. Management of Zone 2 will be given highest priority in protecting the developed portions of the park from eroding.

The transition zone also separates Zone 1, the developed park landscape with the highest maintenance requirements from the more naturalized hillsides with fewer and less frequent maintenance demands.

Many established SPR viewpoints have successfully defined the transition zone with a single or double row of shrubs creating a hedge effect.

Because of the success of these established locations, it is recommended that a similar treatment be implemented for all SPR viewpoint sites. This management prescription functions to:

- visually define the edge of the slope
- create a natural barrier for public safety
- protect the top of slope from both surface and sheet erosion
- provide a physical definition for scope of maintenance work between the developed park and the naturalized urban forest
- presents an aesthetic appeal, reinforcing the value as a public amenity

***Plant selection***

Since maximizing views is of greatest importance in managing these parks, plants historically located in the transition zone required routine pruning to maintain viewsheds. Typically, plants used as hedges in the transition zone have been labor intensive requiring frequent 'topping' or hedging to maintain height and size .i.e. English holly, English laurel.

Since the intent of viewpoint vegetation management prescriptions is to reduce labor costs and maintenance demands, plant selection proposed for the Zone 2 –Transition Zone will be plant species that do not require routine pruning to optimize views. Plant selection will be based on the following criteria:

- genetically predetermined not to exceed a general height of 3-4 feet
- growth habit provides a physical barrier with appropriate spacing
- cultural requirements reflect the winter wet and dry summer cycle
- available within the local nursery industry.
- meet Crime Prevention Through Environmental Design (CPTED) guidelines (enclosed in appendices)
- input from the community.

**Zone 3 – Hillside**

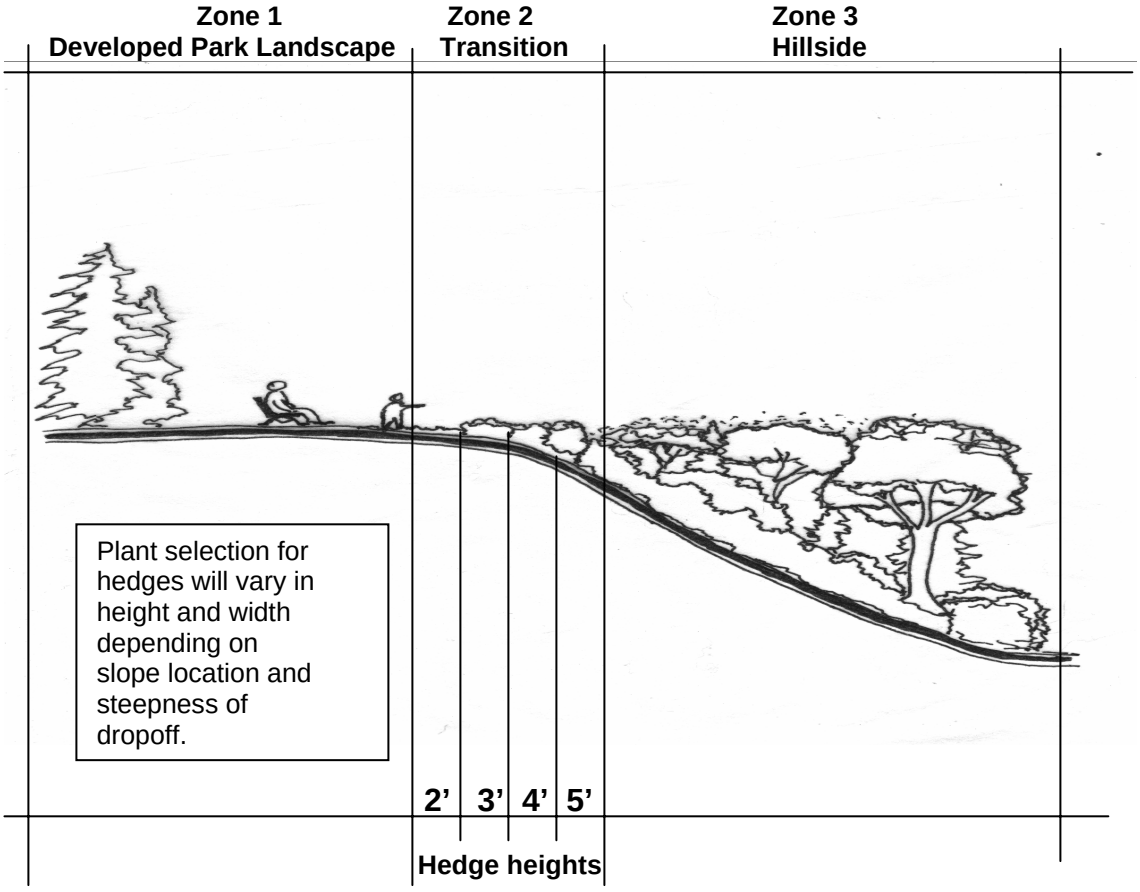
The hillside zone shall be managed toward natural conditions, requiring the least intensive maintenance. Plantings and management in this zone will encourage vegetative cover with plants that characteristically:

- vary in root development; offering a range in depth and density for soil stability
- provide habitat for wildlife
- adapt to minimal maintenance
- are adapted to the typical wet and dry cycles of the region
- provide screening for adjacent/downhill property owners.

Native plants are well suited to this zone and many native species already exist in some sites. These can be augmented with additional natives after tree management and invasive week removal occurs. Specific management prescriptions for each hillside condition are noted in the Site Evaluation and Management Recommendation section of the plan.

The figure below graphically represents a typical section of the Landscape Management Zones.

**Figure II - 1**



## III. Management Prescriptions

Seattle's viewpoint parks are located in a variety of physical settings, ranging from developed shoreline locations to more naturalized sites perched at the top of slopes or along hillsides. The twenty four sites evaluated for the Vegetation Management Plan are representative of the range of conditions and maintenance issues at viewpoint parks.

Any site that has gone through restoration will require annual maintenance to prevent weed invasion and plant loss. The established urban forest of many sites can be managed on a 3-5 year cycle with only occasional attention to view pruning and tree removal. To address both immediate maintenance issues, as well as long-term care, Vegetation Management prescriptions address both:

1) initial maintenance strategies to restore views, or renovate unused and/or disturbed sites
2) post restoration and/or general maintenance schedules for long-term care

**Maintenance Strategies for Existing Conditions**
The initial analyses of each site determined the range of management tasks needed to address current conditions and restore sites to their intended view and use. Though not all sites will require each task, the following list of horticultural practices identifies key maintenance components:

- tree removal
- tree pruning
- invasive week removal
- erosion control
- planting
- mulching
- irrigation

To determine the extent of work and organize a course of action, view sites are categorized and grouped according to the horticultural practices and the scope of work required for restoration. If initial restoration efforts are significant in scope, these activities may be phased over three to five years. The following three maintenance categories are used to classify sites according to the initial management approach selected for the site, and are described below:

1) Canopy conversion, replacing and restoring vegetation
2) Tree pruning and weed removal,
3) Slope stability and erosion control.

:

**1) Canopy Conversion**

Sites identified for canopy conversion meet one or more of the following criteria:

- major tree removal due to previous 'topping' practices, poor health and condition
- understory vegetation is dominated by invasive weed species
- viewshed is obstructed with inappropriate species of tall trees

The canopy conversion category is reserved for sites where more than 70% of the intended SEPA view is obstructed by the adjacent urban forested condition. This management strategy infers a renovation of the site followed by restoration to convert the dense canopy impediment to a more genetically preferred planting of tree, shrubs and groundcovers that will not block views over time. The maintenance tasks for canopy conversion sites generally include tree pruning, tree removal, invasive weed elimination, erosion control (where necessary), planting and mulching.

**2) Pruning Required and/or Invasive Weed Removal**

Viewpoints listed for pruning and weed elimination generally have 80% or greater of the SEPA intended view in tact. Pruning standards will be primarily limited crown thinning. However, where specific tree canopies cause major impacts to the view corridor, crown reduction may occur.

Frequently, sites listed for pruning and weed removal have major sections of hillsides invaded with opportunistic weeds. On sites where invasives are well established, more preferred species are unable to compete. In most cases, weed eradication will need to occur in several phases of both physical and chemical removal. Replanting may need to be considered where weed invasion was severe and exposed soil results from their eradication.

**3) Slope Stability and Erosion Control**

The management of viewpoint parks is dedicated to protecting and preserving natural resources while enhancing views. Preserving soil and slopes for long term stability is an integral part of all slope restoration work. Sites identified for slope stability and erosion control vary from locations with a minor amount of exposed soil to steep sites with signs of previous mass failures.

There are important distinctions between erosion and slope failure. Both slope stability and erosion control are accelerated by the introduction of more water to a site. Erosion, the surface movement of

soil caused by moving water, is independent from slope failure, which is a function of the geological structure beneath the surface. Erosion is also increased by the removal of vegetation; generally slope failure is not impacted by vegetation removal. This program will directly address changes to surface vegetation which may have a direct impact on erosion potential. Impacts to slope stability will be evaluated by geotechnical professionals on a site by site basis.

Many of the park sites designated for erosion control prescriptions also require tree pruning, tree removal, invasive weed removal and restorative planting depending on existing conditions. Erosion control measures are an important part in mitigating erosion potential increased by these activities. Planting is critical for all exposed soil locations to prevent surface erosion from occurring. Research has shown that vegetation is critical in protecting slopes from surface soil erosion. In addition, planting with a layered canopy of vegetation provides the root structure variety and depth to help stabilize greater depths of soil.

Plants can not prevent an unstable slope from failure. Sites where mass failures have occurred or where seeps are present require a geotechnical/hydrology specialist to evaluate and determine the appropriate approach in stabilizing the slope. All sites within Sensitive Slopes or Environmentally Critical Zones as identified by DPD Critical Areas Ordinance will be evaluated by geotechnical professionals to ascertain the level of slope protection required and/or suitability of the work proposed. As no grading or fill is proposed by this program, potential impacts to slope stability are most likely to occur in regards to changes in the amount of water on site. Careful consideration must be made regarding irrigation of installed plants.

The following sites are adjacent to Critical Areas by Designated by Ordinance as Steep Slopes (greater than 40%).

Bagley Park Viewpoint
Belvedere (Admiral) Park
Betty Bowen (Marshall) Park
Bhy Kracke Park
Commodore Park
Discovery Park / Daybreak Star
East Portal - I-90 Overlook
Jose Rizal Park
Kobe Terrace Park
Lakeview Park
Louisa Boren Park
McCurdy Park

Mt. Claire-Mt. Baker
Myrtle Edwards Park
Rainbow Point (Banner Place)
Sunset Hill Park
Twelfth Avenue South Park
Viretta Park

**Maintenance Categories for Existing Conditions**

The following is a summary of general tasks assigned to each category of maintenance work to be accomplished through this program.

| CATEGORY | PRIMARY MAINTENANCE TASKS |
|---|---|
| **1 - Canopy Conversion** | 1. Tree removal<br>2. Invasive weed removal<br>3. Erosion control<br>4. Layered vegetation planting<br>5. Mulching |
| **2 - Pruning and/or Invasive Weed Removal** | 1. Tree pruning<br>2. Invasive weed removal<br>3. Planting - Zone 2 Transition hedges and groundcovers<br>4. Mulching |
| **3 - Slope Stability and Erosion Control** | 1. Tree removal and pruning<br>2. Invasive weed removal<br>3. Erosion control<br>4. Planting – Zone 2 Transition hedges and groundcovers<br>5. Mulching |

The following table assigns maintenance categories to each of the 24 sites:

## VIEWPOINT MANAGEMENT AND MAINTENANCE REQUIREMENTS

| Viewpoint Park | % intended view (2004 status) | Maintenance Priority | Critical Area / Steep Slope | WORK REQUIRED | | | | | | MANAGEMENT ZONES | | | MAINTENANCE FREQUENCY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Tree Pruning | Tree Removal | Slope and Erosion Control | Invasive Weed Removal | Replanting | Canopy Conversion | ZONE 1 Landscape | ZONE 2 Transition | ZONE 3 Hillside | 5 - yr cycle | 3 -yr cycle | Annual |
| **1. Canopy Conversion** | | | | | | | | | | | | | | | |
| Betty Bowen (Marshall) | 40 | Highest | Yes | X | X | | X | | X | | X | X | | | X |
| Lakeview Park | 75 | Highest | Yes | X | X | X | X | | X | | | X | | X | |
| Louisa Boren Viewpoint | 65 | Second | Yes | X | X | X | X | | X | | X | X | | X | |
| Riverview Playfield Park | 30 | Highest | Yes | X | X | | X | | X | | X | X | | | X |
| Dr. Jose Rizal Park | 90 | Highest | Yes | X | | X | | | X | | X | X | | X | |
| **2. Tree Pruning and/or Invasive Removal** | | | | | | | | | | | | | | | |
| Boren-Pike-Pine (4-Columns) | 80 | Second | | X | | | X | X | | X | X | X | X | | |
| Discovery Park/Daybrk Star | 75 | Third | Yes | X | | | X | X | | | X | X | | X | |
| East Portal - I-90 Overlook | 95 | Third | Yes | X | | | | X | | | | | X | | |
| McCurdy Park | 10 | Highest | Yes | X | | | X | | | | | X | X | | |
| Montlake Playfield Park | 10 | Highest | | X | X | | X | | X | | | X | | X | |
| Myrtle Edwards Park | 95 | Third | Yes | X | | | X | X | | X | | | X | | |
| Rainbow Point (Banner Place) | 80 | Third | | X | | | | | | | | X | X | | |
| Roanoke Street Mini-Park | 50 | Second | | X | | X | X | X | | X | | X | X | | |
| Sunset Hill Park | 90 | Second | Yes | X | | | X | | | | X | X | | X | |
| Twelfth Avenue South Park | 85 | Third | Yes | X | | X | X | | | | X | X | X | | |
| Viretta Park | 50 | Second | Yes | X | | | X | | | X | | X | X | | |
| West Seattle Golf Course | 75 | Third | | X | | | | | | X | | X | X | | |
| West Seattle Rotary Park | 50 | Highest | | | X | X | X | | | | X | X | | X | |
| **3. Slope Stability and Erosion Control** | | | | | | | | | | | | | | | |
| Bagley Park Viewpoint | 50 | Second | Yes | X | X | X | X | X | | | X | X | | X | |
| Bhy Kracke Park | 25 | Highest | Yes | X | X | X | X | X | | X | | X | | X | |
| Commodore Park | 50 | Second | Yes | X | X | X | X | X | | | X | X | | X | |
| Kobe Terrace Park | 90 | Third | Yes | X | | X | | X | | X | | | X | | X |
| Mt Claire Viewpoint - Mt. Baker | 85 | Third | Yes | | X | X | X | X | | | X | X | X | | |
| Belvedere VP (Admiral) | 90 | Second | Yes | X | | | X | | | | X | X | | X | |

## General Maintenance Practices for Long-term Care

The variation in site conditions and management requirements for SPR viewpoints prohibits the development of a 'general rule' for the fundamentals of long-term landscape maintenance: watering, pruning and weed control. However, regular monitoring will determine if routine (monthly), frequent (quarterly) or sporadic (annually) maintenance is adequate for the site. Since regular maintenance occurs in the developed parts of the park, the staff familiar with the site could integrate the monitoring of viewpoint vegetation into the maintenance schedule. Recognizing the gardener's scope of maintenance work does not include the native growth areas, their regular presence provides an opportune time to review conditions and alert supervisors to maintenance issues before they are out-of-control. Routine site observation and follow-up protocol will avert the need to periodically renovate and restore large areas at considerable cost.

### Monitoring after Restoration

After a site has been renovated, a quarterly Field Evaluation Checklist form (Appendix 1.) should be completed to identify impending maintenance needs:

- tree removal
- tree pruning
- invasive week removal
- erosion control
- planting
- mulching
- irrigation

## Managing the Urban Forest

Since major portions of most viewpoint parks are natural areas, management is adapted to a more cyclical approach for maintenance. To maintain views once they are restored, management of the urban forest can occur within a 1, 3 or 5 year cycle depends upon its location, tree species obstructing views, level of visibility and frequency of use. Restoration planting of trees and shrubs must meet the Performance Standards for survival outlined is this plan (located in section IV. Maintenance and Management Procedures/monitoring.) However, all parks should be reviewed bi-annually for any hazard potential or public concern that might arise. One or more of the following criteria determined a park's designation for general maintenance frequency:

5-year maintenance cycle

- Requiring only routine view pruning, crown thinning or crown reduction
- Dominance of conifer species
- Requiring occasional tree removals

3-year maintenance cycle

- Requiring sapling removal i.e. Alders and Big Leaf Maple
- Moderate potential for view obstruction

1-year maintenance cycle

- Sucker regrowth from re-sprouting stumps
- High potential for view obstruction
- Intensive park use and high visibility

***Vegetation Management Prescriptions for Viewpoint Study Sites***

Individual management prescriptions for each park are found in the final section of this report, VI Site Evaluations and Management Recommendations. Projects at each park will be instituted as separate projects, with appropriate review by internal staff and levels of public involvement. Individual projects will follow established Parks policies to include the Public Involvement Process (PIP, See Appendix 2). Phasing necessary to accommodate budget, scope or planning issues will be developed during this stage of the project. Each document is intended for preliminary field use in the scoping of work necessary at each park and provides the following information:

- Location map and description
- Viewpoint Category
- Summary of Existing Conditions
- Management Prescriptions
- Maintenance of Existing Conditions
- General Maintenance Practices
- Implementation Plan

The scope of work on a site determines the level of planning and public involvement Parks will engage in. The following selected criteria are most applicable to viewpoints to establish the level of Public Involvement required for each site:

Designation as Critical Area
Designations as an Olmsted park
Proposals impact on the sites appearance
Proposals impact on or increase in the use of the site

Neighborhood interest
Proposals impact on surrounding neighbors
Proposals affect on persons with disability or other special populations
Proposals "unintended consequences"
Proposals impact on a documented need:
    Specifically at viewpoints, the loss of recreational opportunity
    Routine maintenance/repair based on a condition assessment

At a minimum one public meeting will be held to discuss projects that meet one or more of the criteria listed above. All projects will post signs notifying neighbors of impending work.

## IV. Maintenance and Management Procedures

**Slope Stability and Erosion Control**
Some of the viewpoint park sites are located on steep slopes potentially subject to instability, surface erosion and land mass movement. Vegetation management prescriptions for each site are outlined which manage existing vegetation and proposes replanting vegetation that supports soil strength and maintain slope stability.

In areas of steep slope, slopes greater then 40%, any activities that may impact geological conditions must be managed by a geotechnical specialist. Subsurface geological stability cannot be achieved through vegetation management. Before projects are implemented, a geotechnical review will be performed by professional engineering staff or contractors. Emphasis will be placed on slopes that meet the ECA Critical Areas Designation. Direct impacts to slope stability are potentially highest from the installation, maintenance and operation of irrigation. All irrigation on slopes will be evaluated and approved by geotechnical staff.

As no excavation or grading is proposed for in this Plan, erosion potential will be limited to those areas cleared of vegetation. Covering exposed soils and preventing surface erosion is the first step in protecting the stability of slopes. Erosion control is the most important reason for planting and maintaining a vegetative cover on slopes.

Mitigation for past practices which lowered soil organic matter levels, cause poor soil structure, and compaction will include the introduction of additional organic matter. The lower nutrient levels often associated with subsoils contributes to lower vegetative cover, which in turn provides less vegetative protection for the soil.

General soil types were identified in each location based upon current information provided from Seattle Public Utilities. Soils type can contribute to

the amount of erosion on a site. The following soil types were found in each location, sites with a “High” Erosion Potential will be evaluated by a geotechnical professional prior to commencement of any work:

| Soil Type | Erosion Potential | Found in Park |
|---|---|---|
| m (silt/sand/debris/slag) | High | Kobe Terrace Park |
| | | Myrtle Edwards Park |
| Qal (silt/sand/gravel) | High | McCurdy Park |
| | | Montlake Playfield |
| Qva (sand/silt) (Esperance Sand) | High | Belvedere Park |
| | | Betty Bowen (Marshall) |
| | | Bhy Kracke Park |
| | | Jose Rizal Park |
| | | Sunset Hill Park |
| Qvlc (silt/clay) (Lawton Clay) | Moderate | Commodore Park |
| | | East Portal - I-90 Overlook |
| | | Lakeview Park |
| | | Twelfth Avenue South |
| | | Viretta Park |
| Qvt (till/hardpan) | Moderate | Bagley Park Viewpoint |
| | | Boren-Pike-Pine |
| | | Discovery Park |
| | | Louisa Boren Park |
| | | Mt. Claire-Mt. Baker |
| | | Rainbow Point |
| | | Riverview Playfield Park |
| | | Roanoke Street |

**Planting Layered Vegetation to Increase Soil Stability**
Current studies indicate the importance of approaching vegetation management on slopes within natural, open space lands from a long-term and holistic perspective. Surface slope stability studies recommend the value of maintaining multi-layered vegetation for the greatest success in stabilizing slopes. Tree roots help to stabilize soil while pumping excess water from saturated soil in wet conditions. Mid-story shrub layers and ground covers produce fibrous root mats that help to keep topsoil on the slope while also helping to break the impact from rain, minimizing raindrop erosion on exposed soils.

**Erosion Blankets**
To retain soil on slopes 30% or greater, or areas identified by professional engineers, an erosion control mat is to be applied prior to planting. Erosion control mats are manufactured for a range of conditions and purposes. Typically, mats adhere to the soil with 20" 'hairpin' staples, spaced 20-25 feet apart in a grid pattern depending on the steepness of the slope. Product selection is based on need and product longevity. Shorter-term needs for moderate slopes with low water flow require difference products than steeper sites with high water movement. Conditions will be evaluated for each site to determine the appropriate type of erosion blanket for the condition. The extent and type of erosion control mat will be reviewed or recommended by professional engineering staff or consultants. Some commonly used examples in order of use:

- jute blankets
- straw mats enclosed in polypropylene netting
- coconut blankets enclosed polypropylene netting
- straw/coconut layered blankets
- uv resistant polypropylene fiber netting

A product information resource for types of erosion control blankets is North American Green Inc.:
*www.nagreen.com/product*

## Pruning and Removal Standards

***Pruning Specifications***
Pruning the viewpoint park site is the preferred maintenance technique when meeting one or more of the following objectives;

- remove the density of the crowns to optimize views and improve tree structure
- reduce wind resistance
- increase the health and condition of the trees
- provide 'view corridors' and 'windowing' to improve views

- lifting lower limbs to optimize views
- reduce hazard potential

Pruning will meet ANSI 300 standards. These standards meet the values and principles of the National Arbor Association (NAA) and the International Society of Arboriculture (ISA). Copies of the standards are found in the Appendix. Pruning will be limited to the removal of: dead, diseased, or dying limbs, co-dominant leaders causing inherent structural problems, crown thinning. Crown reduction (pollarding) techniques may be practiced if determined necessary by a SPR Urban Forester. As specified in the standards under Pruning Practices, section 5.6.2.2, no more than 25% of the crown can be removed within an annual growing season for any of the trees identified on the tree pruning plan. If a greater percentage of canopy removal is preferred, removal and replacement should be considered.

***Removal Specifications***

Tree removal is the preferred maintenance technique when meeting one or more of the following objectives:

- potentially hazardous trees that cannot be abated by pruning
- dead, decayed or diseased trees
- trees in poor health, condition and structure due to previous 'topping' practices
- optimize view sheds and replace trees with more appropriate species
- increase light to the forest floor for the establishment of more preferred trees and shrubs.

Final determination for any tree removal will be determined by a SPR Urban Forester in accordance with the departments, *Tree Management, Maintenance, Pruning and/or Removal Policy and Procedures,* adopted June 1, 2001. If trees of significant size or number are to be removed from a Viewpoint, an appropriate level of public involvement process will be instituted. As erosion potential increases with stump removal and grinding, no stumps will be removed on slopes. All trees to be removed will be cut as close to the ground as is practical.

***Hazardous Trees***

For a tree to be considered hazardous there must be a target and a potential for failure. Targets can range from neighboring trees in wooded areas with no public access (low hazard), to houses, buildings or public use areas (high hazard potential). In addition, there needs to be one or more reasons to believe the tree could fail based on its health, condition, and structural integrity. Potentially hazardous trees are to be evaluated by a skilled arborist to determine the appropriate action in abating the

situation. Prior public notification for hazard tree removal may be limited by the nature of the hazard. If possible, signage is placed a minimum of two weeks prior to removal.

***Woody debris from Pruning and Removal Work***
All woody debris 8 inches or less in diameter should be managed by one of the following practices:
1) where site restoration requires a 'Spyder' excavator or mulching machine to dispose of invasive understory growth, a 'dice and scatter' technique can be used to disperse the mulch. A maximum 3 inch layer of diced brush can be spread throughout the site. Excess of this amount should be removed and stored for later use. If restoration planting is planned, it will occur within pockets of the brush mulch. (Spyder excavation can be contracted with KempWest Inc. 425-334-8253 in Everett, Washington)

2) where a predominance of tree pruning and removal occurs on a site, woody debris and brush should be hauled and chipped for reuse. Wood chips will be stored at designated locations for mulch reapplication if restoration planting is planned.

*NOTE: To prevent a public nuisance and fire fuel from accumulating, dried brush piles of leaves, downed limbs and branch debris should be addressed immediately following pruning and removal work.*

***Ecosystem Restoration***
The following procedures should be utilized where possible to enhance ecosystem restoration and wildlife habitat:

- wood greater than 8 inches in diameter can be cut in lengths no greater than 20 feet and left in contact with the soil for degradation, forest restoration and ecosystem management value. Leave large branches and trunks running parallel with the slope except in steep slope areas. Number 3 rebar should be available for staking logs to in position and to prevent downward movement where needed.
- remove specified trees to snag height (20-30 feet) to increase wildlife habitat (identification and quantity will be determined by the projects' urban forester)
- retain stumps resulting from removals to add natural compost and to maintain slope stability until new vegetation is established

In the event the amount of woody debris exceeds the threshold for reuse (as determined by the projects' Urban Forester), wood will be cut 18 inch lengths and left on site for firewood under the direction of a SPR Urban Forester.

***Soil Compaction***
To minimize soil compaction on viewpoint sites, care should be given during pruning, removal and clearing activities to prevent an imbalance of drainage, surface run-off and over saturated soil conditions. The following guidelines will help to prevent compaction and protect slopes during restoration work:

- identify locations for ingress and egress for rehabilitation activities
- limit heavy equipment use to designated areas
- prohibit site work during wet conditions when soils are near saturation
- locate and indicate in the field 'haul and drag' routes for removing downed debris

## Invasive Weed Removal

Control methods for exotic weed species shall emphasize the least toxic approaches available, emphasizing hand-pulling, mowing, girdling and grinding (Spyder machinery). Use of chemical controls will be limited and subject to approval by SPR staff. Herbicides shall be applied by a licensed pesticide applicator only, according to label instructions. Final recommendations for weed removal and control will be determined by the SPR Senior Gardener and Urban Forestry staff. The following list identifies weeds most frequently found within the viewpoint parks. Those indicated with a * will require the greatest amount of labor and cost to control because of their extensive invasion.

***Targeted exotic weeds***

| | |
|---|---|
| **Rubus discolor* | Himalayan blackberry |
| **Hedera helix* | English Ivy |
| *Ilex aquifolium* | English holly |
| Prunus laurocerasus | English laurel |
| **Clematis vitalba* | Wild clematis |
| Cytisus scoparius | Scotch broom |
| Equisetum hyemale | Horsetail |

***Eradication of Himalayan Blackberry***
Current research indicates the best method of eradicating Himalayan blackberries requires an integrated management approach combining both physical removal of the plant along with foliar application of the systemic herbicide Roundup for regrowth.

Roundup is a systemic herbicide and an EPA confirmed product, for a safe, but aggressive approach to eradicating invasive blackberries in upland areas. Procedures for eradication of invasive Blackberry in upland areas:

1) An early spring cutting of plants to the ground and direct application of Roundup on the cut stump.
2) A follow up foliar application mid-summer on re-sprouting leaves from cut stumps within 1 month of initial cutting.
3) A follow-up application in late summer or fall will increase the systemic value in the roots to minimize new growth the following year.

These procedures may require two seasons before eradication is complete. Planting could occur after the first year's application with regular spot treatments in resurgence areas for the subsequent year.

Other invasive species are more easily controlled by physical removal. Many species listed above are frequently 'bird planted' and generate readily from seeds. It is recommended to remove these species as they will compete for light and water with new plantings. Lastly, English Ivy should be eliminated from the base of all trees. Research data indicates that ivy left growing on trees will become woody and girdle the tree restricting the translocation of water and nutrients. Removing English Holly, English Laurel and English Ivy should occur annually and be a part of on-going maintenance practices.

## Restoration Planting

### *Site Preparation*

In preparing the site for planting, the following procedures are to be completed:

1) all tree pruning and removal work will have been completed
2) all woody debris has been removed from the site
2) invasive weed species have been eliminated
3) mulch is available for application after planting
4) planting soil is free of ground brush or wood chips at the root level (woody mulch mixed with soil will prohibit nitrogen availability to plants)
5) water or irrigation is available for plant establishment following planting

### *Tree Replacement Requirements*

Tree replacement will meet the criteria stated in the SPR's *Tree Management, Maintenance, Pruning and/or Removal* policy adopted in June, 2001:

> Section 6.5.2 Performance Criteria: Replacement of Trees
> At minimum, each tree that is removed will be replaced by planting another tree close to the original location. Tree species selection and numbers will be required to meet or exceed the loss of mature canopy proposed by the project.

The species of replacement trees may vary from the species removed if they can meet the following replacement criteria:

- provide equal or greater canopy coverage
- are genetically appropriate for height in prohibiting obstruction of views
- require little or no maintenance, and are adapted to winter/wet and summer/dry climate
- provide enough light to prohibit excessive shading of understory plants

***Shrub and Groundcover Replacement Requirements***

The following formula is recommended by King County Department of Development and Environmental Services (DDES), specified in the *Restoration and Enhancement Guidelines* publication. The formulas have been field tested and provide the necessary understory cover to meet performance standards and compete with the invasive weed re-establishment.

Total SF of Area X 0.028 per square foot for shrubs = # of shrubs planted 6' on center.

Total SF X 0.063 per square foot for groundcovers = # groundcovers planted 4' on center.

All plants must meet the American Standard for Nursery Stock as outlined in ANSI Z60.1-1996.

***Plant Selection***

A primary factor in selecting plant species was to choose trees and shrubs whose genetically mature height minimizes the need for pruning or topping to retain viewsheds.

Plant selection considers predominately native plants or other species that will naturalize and adapt to the site's light, soil and water conditions.

Other criteria considered in selecting plants:

- genetically appropriate for viewpoint restoration
- readily available in the nursery trade
- reduced maintenance demands
- assist in maintaining slope stability
- attract wildlife and support their habitat needs
- provide species diversity to re-establish a healthy, native eco-system
- meet public safety criteria of CPTED (Crime Prevention through Environmental Design)
- low implementation costs
- considers input from citizens

***Plant Recommendations***

**Zone 1 – Developed park landscape**
Replanting in this zone should be done under the direction of the specific park's senior staff and gardeners. Plant recommendations and management practices should integrate with the maintenance of the existing vegetation. Plant selections will be included in discussions with the public as part of the PIP.

**Zone 2 – Transition area at crest of slope**
Selected plants provide a hedge-effect when planted in close proximity. Species have been chosen for height, spread and density to create a barrier between Zone 1 and Zone 3. Where appropriate several layers of shrub may be needed to protect the crest of the slope from eroding. Plants listed vary in height and are selected for appropriate placement on the slope to optimize views. Plants at the top of slope should not exceed 3' in height. Taller plants can be used to stabilize conditions where the grades decline. Specific plant selection and location will be included in discussions with the public as part of the PIP.

Species can be intermixed for seasonal interest and aesthetics.

| |
|---|
| SHRUBS 2-3' IN HEIGHT |
| Abelia grandiflora 'Edward Goucher' - Abelia |
| Berberis thunbergii ''Crimson Pygmy. – Dwf. Barberry |
| Berberis verruculosa – Warty Barberry |
| Ilex cornuta 'Dwf Burford' – Dwf Japanese Holly |
| Ilex crenata 'Helleri' - Japanese Holly |
| Mahonia repens - Creeping Oregon Grape |
| Symphoricarpos 'Hancock' – Hancock Coralberry |
| SHRUBS 5-6' IN HEIGHT |
| Arbutus unedo 'Compactus' – Dwf StrawberryTree |
| Berberis darwinii - Barberry |
| Cornus stolonifera – Red-twig Dogwood |
| Mahonia aquifolium – Oregon Grape |
| Myrica californica – California Myrtle |
| Pinus mugo mugo – Compact Mugho Pine |
| Rosa rugosa – Rambling Rose |
| Symphoricarpos albus - Snowberry |
| Vaccinium ovatum - Evergreen Huckleberry |

**Zone 3 – Hillside**

Selected plants for Zone 3 provide multi-layered vegetation for the greatest success in stabilizing slopes and creating a more natural environment. Plantings are to be intermixed with using both evergreen and deciduous trees, tall shrubs, small shrubs and groundcovers. Specific plant selection and location will be included in discussions with the public as part of the PIP.

| **TREES** |
|---|
| Acer circinatum-Vine Maple/multi-leader |
| Amelanchier alnifolia - Serviceberry |
| Rhamnus purshiana - Cascara |
| Corylus cornuta - Hazelnut |
| Oemleria cerasiformis – Indian Plum |
| Pinus contorta - Shore Pine |
| Thuja plicata 'Excelsior' - Western Red Cedar ' |
| **SHRUBS** |
| Holodiscus discolor - Oceanspray |
| Mahonia aquifolium – Oregon Grape |
| Myrica californica – Calif. Myrtle |
| Physocarpus capitatus – Pacific Ninebark |
| Rosa rugosa – Rambling Rose |
| Rubus spectabilis – Salmonberry |
| Sambucus racemosa - Red Elderberry |
| Stranvaesia davidiana 'Undulata' |
| Symphoricarpos albus - Snowberry |
| Vaccinium ovatum - Evergreen Huckleberry |
| Vaccinium parvifolium -Dec. Huckleberry |
| Polypodium scouleri - Licorice Fern |
| Polystichum munitum - Sword Fern |
| Vancouveria hexandra - Vancouveria |
| **GROUNDCOVERS** |
| Arctostaphylos uva-ursi - Kinnikinnick |
| Cornus sericea 'Kelseyi' – Kelsey Dogwood |
| Fragaria chiloensis – Coastal Strawberry |
| Mahonia repens – Creeping Mahonia |
| Parthenocissus tricuspidata 'Veitchii' |
| Rosa wichuriana – Memorial Rose |
| Symphoricarpos mollis - Creeping Snowberry |

***Fertilizer and Mycorrhizal Applications***
Both mycorrhizal fungi and fertilizer can be applied at time of planting. The mycorrhizal fungus form symbiotic relationships with the plant roots increasing their ability to take in nutrients and water from the soil and the plants provide food for the fungus.

Planting fertilizer can be applied in a compressed tablet form such as 20-10-10 (20% nitrogen, 10% phosphorus, 10% potassium) such as Agriform with micro-nutrients added, or an approved equal. Application rates should comply with the manufacturer's recommendations.

***Mulching***
All restoration areas are to be mulched with 3 to 6 inches of wood chips, stockpiled from tree removal and pruning operations. Prevent any direct contact of mulch with the trunks or stems of plants. Wood chips will suppress weeds, aid soil composition and water retention

***Irrigation***
Temporary irrigation will be imperative to maximize survivability of restoration plantings and to encourage new growth competitive with weed resurgence. Irrigation installation, maintenance and design will be evaluated and approved by geotechnical staff on slopes which exceed 40%. Physical disconnection of the irrigation system from supply lines will occur during the winter and if possible during non operational periods. All irrigation systems will be evaluated annually for leaks and complete operation. Recommended rates for a three year plant establishment period are:

- Apply one inch of water per week from June-October unless adequate rainfall occurs

***Performance Standards***
Monitor and suppress the invasion of weeds throughout the site. If herbicides are used for weed control, conservative treatment methods should be used i.e. wiper application for stump treatment of sucker regrowth, selective hand-spraying for spot treatments. All effort will be made to reduce the amount of chemical utilized on viewpoint sites.

The following performance standards are recommended:
1) Vegetation will have 80% survival after 3 years
2) Tree and shrub cover will be greater than 10% after one year, greater than 30% after two years and greater than 50% after three years.
3) Non-native invasive plants will not make up more than 10% of cover in any growing season.
4) Replace dead plants up to and including the third year after planting.

## V. Implementation

### Priority Actions

Viewpoint park sites are rated on a scale (Highest, Second, Third) to determine the urgency and sequence in which site issues and conditions would be addressed by the Urban Forestry Staff. (See Viewpoint Maintenance and Management Matrix, Page 11) The Highest Priority sites will be address first. The following factors influence the priority designation:

- amount of intended view obstructed by vegetation
- location and amount of park use
- imminent issues that need to be addressed i.e. erosion, accessibility
- concurrent with other park improvements
- degree of work required for restoration
- level of community support and input

By these criteria the Highest Priority sites are:

Betty Bowen (Marshall)
Lakeview Park
Riverview Playfield Park
Dr. Jose Rizal Park
McCurdy Park
Montlake Playfield Park
West Seattle Rotary Park
Bhy Kracke Park

### Phasing

Viewpoint maintenance prescriptions for site restoration typically include one or more of the following phases:

Phase 1 - Scoping/project planning, geotechnical review (as necessary), public involvement (as Described in Public Involvement Policy, Appendix)
Phase 2 - Tree removal and pruning
Phase 3 - Eradicate invasive weeds
Cover slopes with erosion control mat (as needed)
Plant layered vegetation
Mulch eroded slopes and new plantings
Provide temporary irrigation
Phase 4 - Plant Zone 2 transition hedges at crest of slope for slope stability and for definition and visual appeal

Phasing is an important measure to reducing immediate negative impacts to a site. Activities within any one of the Phases listed above may occur in sub phases, depending upon the site and scope of work. Initial scoping and public involvement may dictate additional phases as well.

**Labor Sources**
Labor Sources include the following paid and unpaid support:

**A. *Urban Forestry Staff*** is responsible for:
1. All arborist work or directing of contracted tree work
2. Invasive removal, erosion control, planting, mulching in a forested or woodland situation (NOT developed landscape sites)
3. Reforestation programs
4. Capital project-related labor or contracts related to establishing care and ongoing maintenance for trees

**B. *District Park Maintenance Staff*** is responsible for:
1. Maintenance of developed areas of parks once Viewpoints restoration is completed
2. Limited implementation work depending on current workloads, skill and interest such as:
   - controlling adjacent vegetation
   - pruning shrubs and small trees for view (groundwork and/or low ladder work)
   - planting (specifically transition hedges and in developed areas)

**C. *Contracted/internal specialists*** for one or more of the following tasks:
- geotechnical review
- invasive weed control
- tree pruning and removal
- environmental impact review
- application of erosion control blankets
- restoration planting
- mulching
- temporary water applications

**D.** Parks Urban Forestry Program relies heavily upon volunteer efforts and alternative funding. Depending on the site conditions and available resources, ***community volunteers*** may be involved in one or more of the following tasks as determined by the project's urban forester or crew chief:
- weeding
- planting
- mulching
- watering
- grant writing
- community outreach

- monitoring

A safety plan must be submitted and approved for all projects using volunteer labor.

## Cost Estimates

### *Clearing Costs for Canopy Conversion*

The Seattle Parks and Recreation (SPR) estimated that under current conditions, labor for one view clearing project of typical size costs approximately $20,000 as noted in the Magnolia Vegetation Management Plan, adopted in 1998.

- small-med shrub clearing is approximately $0.10/SF
- large shrub-small tree clearing is approximately$ 0.15/SF

### *Planting Costs*

To estimate planting costs use the following standards:
$3.00 – 3.50/ SF for planting layered vegetation at approximately 5’ on center:

- 1 gallon groundcovers and small shrubs,
- 2 gallon larger shrubs
- 5 gallon trees (approx. 1 inch caliper)

### *Erosion Control*

Costs for erosion control blankets are approximately:
$.50/SF for jute material